SEQUENCE LISTING

<110> Dulac, Catherine
Axel, Richard

<120> Cloning Of Vertebrate Pheromone Receptors And Uses Thereof

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<151> 1996-10-18

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<170> PatentIn Ver. 2.1

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Dulac and Axel
Serial No.: Not Yet Known
Filed: Herewith
Exhibit 1

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Arg Gly Leu Ser Leu Cys Thr Ser Cys Leu Leu Ser Val Leu Gln Ala
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Ile Ile Leu Ser Pro Arg Ser Ser Cys Leu Ala Lys Phe Lys His Lys
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Pro Ser His His Ile Ser Cys Ala Ile Leu Ser Leu Ser Val Leu Tyr
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Leu Thr Thr Asn Asp Phe Ile His Val Thr Gln Trp Cys Ser Ile Leu
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Pro Met Ser Tyr Leu Met Gln Ser Met Phe Ser Thr Leu Leu Ala Ile
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Arg Asp Val Phe Leu Ile Ser Leu Met Val Leu Ser Thr Trp Tyr Met
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Arg Gly Leu Ser Leu Ser Thr Thr Cys Leu Leu Ser Val Leu Gln Ala
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Ile Ile Leu Ser Pro Arg Ser Ser Cys Leu Ala Lys Tyr Lys His Lys
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Pro Pro His His Ile Phe Cys Ala Met Leu Phe Leu Ser Val Leu Tyr
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Leu Thr Thr Asn Asp Phe Ile His Val Ser Gln Ser Cys Ser Ile Leu
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Pro Met Ser Tyr Leu Met Gln Ser Met Phe Ser Thr Leu Leu Ala Ile
            180                 185                 190

Arg Asn Val Phe Leu Ile Ser Leu Ile Val Leu Ser Thr Trp Tyr Met
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Val Ala Leu Leu Cys Arg His Arg Lys Gln Thr Arg His Leu Gln Asp
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Thr Ser Leu Ser Arg Lys Ala Ser Pro Glu Gln Arg Ala Thr Arg Ser
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Ile Leu Met Leu Arg Ser Leu Phe Gly Leu Met Ser Ile Phe Asp Ser
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Leu Leu Phe His Ile Phe Lys Phe Ile Arg Gly Gln Arg Ser Asp Leu
         35                  40                  45

Thr Asp Leu Pro Ile Gly Leu Leu Ser Leu Ile His Leu Leu Met Leu
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Leu Met Gly Ala Phe Ile Ala Ile Asp Ile Phe Ile Ser Trp Arg Gly
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Trp Asp Asp Ile Ile Cys Lys Phe Leu Val Tyr Leu Tyr Arg Ser Phe
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Arg Gly Leu Ser Leu Cys Thr Thr Cys Met Leu Ser Val Leu Gln Ala
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Ile Thr Leu Ser Pro Arg Ser Ser Cys Leu Ala Lys Phe Lys His Lys
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Ser Pro His His Val Ser Cys Ala Ile Ile Ser Leu Ser Ile Leu Tyr
    130                 135                 140

Met Phe Ile Ser Ser His Leu Leu Val Ser Ile Asn Ala Thr Pro Asn
145                 150                 155                 160

Leu Thr Thr Asn Asn Phe Met Gln Val Thr Gln Ser Cys Tyr Ile Ile
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Pro Leu Ser Tyr Leu Met Gln Ser Met Phe Ser Thr Leu Leu Ala Ile
            180                 185                 190

Arg Asp Ile Ser Leu Ile Ser Leu Met Val Leu Ser Thr Cys Tyr Met
        195                 200                 205

Glu Val Leu Leu Cys Arg His Arg Asn Gln Ile Gln His Leu Gln Gly
    210                 215                 220

Thr Asn Leu Ser Pro Lys Ala Ser Pro Glu Gln Arg Ala Thr Gln Thr
225                 230                 235                 240

Ile Leu Met Leu Met Thr Phe Phe Val Leu Met Ser Ile Phe Asp Ser
                245                 250                 255

Ile Val Ser Cys Ser Arg Thr Met Tyr Leu Asn Asp Pro Thr Ser Tyr
            260                 265                 270

Tyr Ile Gln Ile Phe Gly Val Asp Ile Tyr Ala Thr Val Ser Pro Phe
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Val Phe Met Ser Thr Glu Lys His Ile Val Asn Phe Leu Lys Ser Met
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Cys Val Arg Val Lys Asn Val
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Phe Gly His Leu Cys Met Leu Leu Gly Glu Asn Lys Pro Lys Pro Ile
35 40 45

His Leu Tyr Ile Ala Ser Leu Ser Leu Thr Gln Leu Met Leu Leu Ile
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Thr Met Gly Leu Ile Ala Ala Asp Met Phe Ile Ser Gln Gly Ile Trp
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Asp Ser Thr Ser Cys Gln Ser Leu Ile Tyr Leu His Arg Leu Ser Arg
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Thr Leu Ser Ser Lys Lys Ser Cys Leu Thr Lys Phe Lys His Asn Ser
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Pro His His Ile Ser Gly Ala Phe Leu Leu Leu Cys Val Leu Tyr Met
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Cys Phe Ser Ser His Leu Ile Leu Ser Ile Ile Ala Thr Pro Asn Leu
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Thr Ser Asp Asn Phe Met Tyr Val Thr Lys Ser Cys Ser Phe Leu Pro
165 170 175

Met Cys Tyr Ser Arg Thr Ser Met Phe Ser Thr Thr Ile Ala Val Arg
180 185 190

Glu Ala Phe Phe Ile Gly Leu Met Ala Leu Ser Ser Gly Tyr Leu Val
195 200 205

Ala Phe Leu Trp Arg His Arg Lys Gln Ala Gln His Leu His Ser Thr
210 215 220

Gly Leu Ser Ser Lys Ser Ser Pro Glu Gln Arg Ala Thr Glu Thr Ile
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Leu Leu Leu Met Ser Phe Phe Val Val Leu Tyr Ile Leu Glu Asn Val
245 250 255

Val Phe Tyr Ser Ser Arg Met Phe Lys Asp Gly Ser Thr Phe Tyr Cys
260 265 270

Val Gln Ile Ile Val Ser His Ser Tyr Ala Thr Val Ser Ser Phe Val
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Phe Ile Phe Thr Glu Lys Arg Met Thr Lys Ile Leu Arg Ser Val Cys
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Asp Leu Tyr Ile Ala Phe Leu Ser Leu Thr Gln Leu Met Leu Leu Ile
20 25 30

Thr Ile Gly Leu Ile Ala Ala Asp Met Phe Met Ser Arg Gly Arg Trp
35 40 45

Asp Ser Thr Thr Cys Gln Ser Leu Ile Tyr Leu Asp Arg Leu Leu Arg
50 55 60

Gly Phe Thr Leu Cys Ala Thr Cys Leu Leu Asn Val Leu Trp Thr Ile
65 70 75 80

Thr Leu Ser Pro Arg Ser Ser Cys Leu Thr Thr Phe Lys His Lys Ser
85 90 95

Pro His His Ile Ser Gly Ala Phe Leu Phe Phe Cys Val Leu Tyr Ile
100 105 110

Ser Phe Gly Ser His Leu Phe Leu Ser Thr Ile Ala Thr Pro Asn Leu
115 120 125

Thr Ser Asp Asn Phe Met Tyr Val Thr Lys Ser Cys Ser Phe Leu Pro
130 135 140

Met Ser Tyr Ser Arg Thr Ser Met Phe Ser Thr Pro Met Ala Ile Arg
145 150 155 160

Glu Ala Leu Leu Ile Gly Leu Ile Gly Leu Ser Ser Gly Tyr Met Val

```
                165                 170                 175

Ala Phe Leu Trp Arg His Lys Asn Gln Ala Arg His Leu His Ser Thr
            180                 185                 190

Ser Leu Ser Ser Lys Val Ser Pro Glu Gln Arg Ala Thr Arg Thr Ile
        195                 200                 205

Met Ile Leu Met Ser Phe Phe Val Val Leu Tyr Ile Leu Glu Asn Val
    210                 215                 220

Val Phe Tyr Ser Arg Met Thr Phe Lys Asp Gly Ser Met Phe Tyr Cys
225                 230                 235                 240

Val Gln Ile Ile Val Ser His Ser Tyr Ala Thr Ile Ser Pro Phe Val
                245                 250                 255

Phe Ile Cys Thr Glu Lys Arg Ile Ile Lys Leu Trp Gly Ser Met Ser
            260                 265                 270

Ser Arg Ile Val Ser Ile
        275
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<210> 13
<211> 310
<212> PRT
<213> Rattus sp.

<400> 13

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Met Arg Arg Ile Ser Thr Leu Tyr Gly Val Val Asp Lys Gln Ala Ile
  1               5                  10                  15

Phe Phe Ser Glu Val Val Ile Gly Ile Ser Phe Asn Ser Ile Leu Phe
             20                  25                  30

Leu Phe His Ile Phe Gln Phe Leu Leu Glu Arg Arg Leu Arg Ile Thr
         35                  40                  45

Asp Leu Ile Ile Ser Leu Leu Ala Leu Ile His Leu Gly Met Leu Thr
     50                  55                  60

Val Met Gly Phe Arg Ala Val Asp Ile Phe Ala Ser Gln Asn Val Trp
 65                  70                  75                  80

Asn Asp Ile Lys Cys Lys Ser Leu Ala His Leu His Arg Leu Leu Arg
                 85                  90                  95
```

```
Gly Leu Ser Leu Cys Ala Thr Cys Leu Leu Ser Ile Phe Gln Ala Ile
            100                 105                 110

Thr Leu Ser Pro Arg Ser Ser Cys Leu Ala Lys Phe Lys Tyr Lys Ser
        115                 120                 125

Thr Gln His Ser Leu Cys Ser Leu Leu Val Leu Trp Ala Phe Tyr Met
    130                 135                 140

Ser Cys Gly Thr His Tyr Ser Phe Thr Ile Val Ala Asp Tyr Asn Phe
145                 150                 155                 160

Ser Ser Arg Ser Leu Ile Phe Val Thr Glu Ser Cys Ile Ile Leu Pro
                165                 170                 175

Met Asp Tyr Ile Thr Arg His Leu Phe Phe Ile Leu Gly Ile Phe Arg
            180                 185                 190

Asp Val Ser Phe Ile Gly Leu Met Ala Leu Ser Ser Gly Tyr Met Val
        195                 200                 205

Ala Leu Leu Cys Arg His Arg Lys Gln Ala Gln His Leu His Arg Thr
    210                 215                 220

Ser Leu Ser Pro Lys Ala Ser Pro Glu Gln Arg Ala Thr Arg Thr Ile
225                 230                 235                 240

Leu Leu Leu Met Ser Phe Phe Val Leu Met Tyr Cys Leu Asp Cys Thr
                245                 250                 255

Ile Ser Ala Ser Arg Leu Met His Asn Gly Glu Pro Ile His His Ser
            260                 265                 270

Ile Gln Met Met Val Ser Asn Ser Tyr Ala Thr Leu Ser Pro Leu Leu
        275                 280                 285

Leu Ile Val Thr Glu Asn Arg Ile Ser Arg Phe Leu Lys Ser Leu Leu
    290                 295                 300

Gly Arg Thr Val Asp Ala
305                 310
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<210> 14
<211> 307
<212> PRT
<213> Rattus sp.

<400> 14

Met Met Asn Pro Val Leu Trp Leu Gln Met Thr Asn Met Ile Ser Tyr
1 5 10 15

Gln Gly Leu Val Arg Thr Phe Pro Asn Ser Ile Leu Phe Phe Ala His
20 25 30

Leu Cys Met Phe Phe Glu Glu Asn Arg Ser Lys Pro Ile Asp Leu Cys
35 40 45

Ile Ala Phe Leu Ser Leu Thr Gln Leu Met Leu Leu Val Thr Met Gly
50 55 60

Leu Ile Ala Ala Asp Met Phe Met Ala Gln Gly Ile Trp Asp Ile Thr
65 70 75 80

Thr Cys Arg Ser Leu Ile Tyr Phe His Arg Leu Leu Arg Gly Phe Asn
85 90 95

Leu Cys Ala Ala Cys Leu Leu His Ile Leu Trp Thr Phe Thr Leu Ser
100 105 110

Pro Arg Ser Ser Cys Leu Thr Lys Phe Lys His Lys Ser Pro His His
115 120 125

Ile Ser Gly Ala Tyr Leu Phe Phe Cys Val Leu Tyr Met Ser Phe Ser
130 135 140

Ser His Leu Phe Val Leu Val Ile Ala Thr Ser Asn Leu Thr Ser Asp
145 150 155 160

His Phe Met Tyr Val Thr Gln Ser Cys Ser Leu Leu Pro Met Ser Tyr
165 170 175

Ser Arg Thr Ser Thr Phe Ser Leu Leu Met Val Thr Arg Glu Val Phe
180 185 190

Leu Ile Ser Leu Met Ala Leu Ser Ser Gly Tyr Met Val Thr Leu Leu
195 200 205

Trp Arg His Lys Lys Gln Ala Gln His Leu His Ser Thr Arg Leu Ser
210 215 220

Ser Lys Ala Ser Pro Gln Gln Arg Ala Thr Arg Thr Ile Leu Leu Leu
225 230 235 240

Met Thr Phe Phe Val Val Phe Tyr Ile Leu Gly Thr Val Ile Phe His
245 250 255

Ser Arg Thr Lys Phe Lys Asp Gly Ser Ile Phe Tyr Cys Val Gln Ile
260 265 270

Ile Val Ser His Ser Tyr Ala Thr Ile Ser Pro Phe Val Phe Val Phe
275 280 285

Ser Glu Lys Arg Ile Ile Lys Phe Phe Arg Ser Met Cys Gly Arg Ile
290 295 300

Val Asn Thr
305

<210> 15
<211> 173
<212> PRT
<213> Homo sapiens

<400> 15
Asn Ile Ser Pro Val Ile Tyr Arg Tyr Arg Leu Met Arg Gly Leu Ser
1 5 10 15

Ile Ser Thr Thr Cys Leu Leu Ser Val Leu Gln Ala Ile Asn Leu Thr
20 25 30

Pro Arg Ser Ser Arg Leu Ala Arg Ser Ser His His Lys Pro Arg Cys
35 40 45

Phe Leu Leu Leu Trp Val Phe His Ile Ser Ile Ser Gly Ser Phe Leu
50 55 60

Val Ser Thr Leu Pro Ser Lys Asn Val Ala Ser Asn Ser Val Thr Phe
65 70 75 80

Val Thr Gln Ser Cys Ser Ala Gly Pro Leu Ser Cys Phe Leu Gly Gln
85 90 95

Thr Ile Phe Thr Leu Met Thr Phe Gln Asp Val Ser Leu Gln Leu Met
100 105 110

Ala Pro Phe Ser Gly Tyr Met Val Ile Leu Leu Cys Arg His Asn Arg
115 120 125

Gln Ser Gln His Leu His Ser Ile Asn Leu Ser Pro Lys Ala Pro Pro
130 135 140

Asp Lys Arg Ala Ile Gln Ser Ile Leu Leu Leu Val Ser Phe Phe Val

145 150 155 160

Phe Met Cys Leu Phe Pro Phe Ala Ala Leu Thr Leu Leu
165 170

<210> 16
<211> 71
<212> PRT
<213> Rattus sp.

<400> 16
Ser Lys Arg Lys Lys Ser Phe Leu Leu Cys Ile Gly Trp Leu Ala Leu
1 5 10 15

Thr Asp Leu Val Gly Gln Leu Leu Thr Ser Pro Val Val Ile Leu Val
20 25 30

Tyr Leu Ser Gln Arg Arg Trp Glu Gln Leu Asp Pro Ser Gly Arg Leu
35 40 45

Cys Thr Phe Phe Gly Leu Thr Met Thr Val Phe Gly Leu Ser Ser Leu
50 55 60

Leu Val Ala Ser Ala Met Ala
65 70

<210> 17
<211> 74
<212> PRT
<213> Rattus sp.

<400> 17
Gly Gln Arg Ser Arg Leu Thr Asp Leu Pro Ile Gly Leu Leu Ser Leu
1 5 10 15

Ile Asn Leu Leu Met Leu Leu Ile Met Ala Cys Ile Ala Thr Asp Ile
20 25 30

Phe Ile Ser Cys Arg Arg Trp Asp Asp Ile Ile Cys Lys Ser Leu Leu
35 40 45

Tyr Leu Tyr Arg Thr Phe Arg Gly Leu Ser Leu Ser Thr Thr Cys Leu
50 55 60

Leu Ser Val Leu Gln Ala Ile Ile Leu Ser
65 70

<210> 18
<211> 174
<212> PRT
<213> Rattus sp.

<400> 18

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Lys Cys Lys Ser Leu Ala His Leu His Arg Leu Leu Arg Gly Leu Ser
  1               5                  10                  15

Leu Cys Ala Thr Cys Leu Leu Ser Ile Phe Gln Ala Ile Thr Leu Ser
             20                  25                  30

Pro Arg Ser Ser Cys Leu Ala Lys Ser Thr Gln His Ser Leu Cys Ser
         35                  40                  45

Leu Leu Val Leu Trp Ala Phe Tyr Met Ser Cys Gly Thr His Tyr Ser
     50                  55                  60

Phe Thr Ile Val Ala Asp Tyr Asn Phe Ser Ser Arg Ser Leu Ile Phe
 65                  70                  75                  80

Val Thr Glu Ser Cys Ile Ile Leu Pro Met Asp Tyr Ile Thr Arg Asp
                 85                  90                  95

Leu Phe Phe Ile Leu Gly Ile Phe Arg Asp Val Ser Phe Ile Gly Leu
            100                 105                 110

Met Ala Leu Ser Ser Gly Tyr Met Val Ala Leu Leu Cys Arg His Arg
        115                 120                 125

Lys Gly Ala Gln His Leu His Arg Thr Ser Leu Ser Pro Lys Ala Ser
    130                 135                 140

Pro Glu Gln Arg Ala Thr Arg Thr Ile Leu Leu Leu Met Ser Phe Phe
145                 150                 155                 160

Val Leu Met Tyr Cys Leu Asp Cys Thr Ile Ser Ala Ser Arg
                165                 170
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<210> 19
<211> 32
<212> PRT
<213> Rattus sp.

<220>

<221> VARIANT
<222> (3)
<223> Xaa at position 3 is Leu or Phe

<220>
<221> VARIANT
<222> (4)
<223> Xaa at position 4 is Ser or Thr or Asn

<220>
<221> VARIANT
<222> (6)
<223> Xaa at position 6 is Cys or Ser

<220>
<221> VARIANT
<222> (7)
<223> Xaa at position 7 is Ala or Thr

<220>
<221> VARIANT
<222> (8)
<223> Xaa at position 8 is Thr or Ala or Ser

<220>
<221> VARIANT
<222> (10)
<223> Xaa at position 10 is Leu or Met

<220>
<221> VARIANT
<222> (12)
<223> Xaa at position 12 is Ser or Asn or His

<220>
<221> VARIANT
<222> (13)
<223> Xaa at position 13 is Val or Ile

<220>
<221> VARIANT
<222> (14)
<223> Xaa at position 14 is Leu or Phe

<220>
<221> VARIANT
<222> (15)
<223> Xaa at position 15 is Gln or Trp

<220>
<221> VARIANT
<222> (16)
<223> Xaa at position 16 is Ala or Thr or Met

<220>
<221> VARIANT
<222> (17)
<223> Xaa at position 17 is Ile or Phe

<220>
<221> VARIANT
<222> (18)
<223> Xaa at position 18 is Ile or Thr

<220>
<221> VARIANT
<222> (21)
<223> Xaa at position 21 is Pro or Ser

<220>
<221> VARIANT
<222> (22)
<223> Xaa at position 22 is Arg or Lys

<220>
<221> VARIANT
<222> (23)
<223> Xaa at position 23 is Ser or Lys

<220>
<221> VARIANT
<222> (27)
<223> Xaa at position 27 is Ala or Thr

<220>
<221> VARIANT
<222> (28)
<223> Xaa at position 28 is Lys or Thr

<220>
<221> VARIANT
<222> (29)
<223> Xaa at position 29 is Phe or Tyr

<220>
<221> VARIANT

<222> (31)
<223> Xaa at position 31 is His or Tyr

<220>
<221> VARIANT
<222> (32)
<223> Xaa at position 32 is Lys or Asn

<400> 19
Arg Gly Xaa Xaa Leu Xaa Xaa Xaa Cys Xaa Leu Xaa Xaa Xaa Xaa Xaa
1 5 10 15

Xaa Xaa Leu Ser Xaa Xaa Xaa Ser Cys Leu Xaa Xaa Xaa Lys Xaa Xaa
20 25 30

<210> 20
<211> 21
<212> PRT
<213> Rattus sp.

<220>
<221> VARIANT
<222> (2)
<223> Xaa at position 2 is Ala or Ser or Val

<220>
<221> VARIANT
<222> (5)
<223> Xaa at position 5 is Glu or Gln

<220>
<221> VARIANT
<222> (10)
<223> Xaa at position 10 is Arg or Gln or Glu

<220>
<221> VARIANT
<222> (11)
<223> Xaa at position 11 is Thr or Ser

<220>
<221> VARIANT
<222> (13)
<223> Xaa at position 13 is Leu or Met

<220>
<221> VARIANT
<222> (14)
<223> Xaa at position 14 is Met or Leu or Ile

<220>
<221> VARIANT
<222> (16)
<223> Xaa at position 16 is Met or Arg

<220>
<221> VARIANT
<222> (17)
<223> Xaa at position 17 is Ser or Thr

<220>
<221> VARIANT
<222> (18)
<223> Xaa at position 18 is Phe or Leu

<220>
<221> VARIANT
<222> (20)
<223> Xaa at position 20 is Val or Gly

<220>
<221> VARIANT
<222> (21)
<223> Xaa at position 21 is Val or Leu

<400> 20
Lys Xaa Ser Pro Xaa Gln Arg Ala Thr Xaa Xaa Ile Xaa Xaa Leu Xaa
1 5 10 15

Xaa Xaa Phe Xaa Xaa
20

<210> 21
<211> 9
<212> PRT
<213> Rattus sp.

<220>
<223> Xaa at position 4 is Val or Ile or Leu, Xaa at position 6 is Pro or Ser, Xaa at position 7 is Phe or Leu, Xaa at position 8 is Val or Leu, Xaa at

position 9 is Phe or Leu

<220>
<221> VARIANT
<222> (4)
<223> Xaa at position 4 is Val or Ile or Leu

<220>
<221> VARIANT
<222> (6)
<223> Xaa at position 6 is Pro or Ser

<220>
<221> VARIANT
<222> (7)
<223> Xaa at position 7 is Phe or Leu

<220>
<221> VARIANT
<222> (8)
<223> Xaa at position 8 is Val or Leu

<220>
<221> VARIANT
<222> (9)
<223> Xaa at position 9 is Phe or Leu

<400> 21
Tyr Ala Thr Xaa Ser Xaa Xaa Xaa Xaa
1 5